

REMARKS/ARGUMENTS

Claim Rejections under Section 102 – Kawakami

Examiner has again rejected Claims 1-4 and 8-13 as being anticipated by Kawakami. Applicant request reconsideration:

Applicant has further limited the one independent claim to further distinguish the present invention from Kawakami. Kawakami does not describe or suggest a device to obtain “multi-spectral images” as claimed by Applicants. The device described by Kawakami is a device for fluorescence imaging at a single spectral range. As described by the Wikipedia encyclopedia: “**Fluorescence** is a luminescence that is mostly found as an optical phenomenon in cold bodies, in which the molecular absorption of a photon triggers the emission of another photon with a longer wavelength.”

In Paragraph 0065 Kawakami states, “The wavelength of the near infrared fluorescence to be detected also varies depending on the contrast agent to be used. In general, an excitation light having a wavelength of 600 to 1000 nm, preferably 700 to 850 nm, may be used and near infrared fluorescence having a wavelength of 700 to 1000 nm, preferably, 750 to 900 nm, may be detected. As the apparatus for generating the excitation light, a conventional excitation light source such as various lasers (e.g., ion lased, dye laser and semiconductor laser), halogen light source, xenon light source and the like may be used. Various optical filters may be used to obtain optimal excitation wavelength, if desired. For detection of fluorescence, various optical filters may be used for selection of the fluorescence generated from the near infrared fluorescent contrast agent.”

All of Applicants’ claims are now limited by “a tunable optical parametric oscillator for producing light at selected narrow band wavelengths within a broad spectral range” and “a camera adapted to detect light at the same selected narrow band wavelengths directly

produced by said tunable parametric oscillator and reflected from or transmitted through said target and to produce multi-spectral images of said target. Applicant produces his multi-spectral images with the reflected or transmitted light produced by the OPO at the same wavelength range that the OPO produces. The Kawakami device relies on fluorescence where an OPO illuminates a target with light at one wavelength range and that light produces a light at a different wavelength range in the target which is detected.

Nothing in Kawakami suggest a multi-spectral image device as claimed by Applicants.

Claim Rejections under Section 102 – Utzinger

Examiner Rejected Claims 1, 2, 4 and 8-13 as being anticipated Utzinger. Applicants request reconsideration:

The Utzinger device is the type of prior art device described in the Background section of the present application. In all cases Utzinger uses filters to obtain multi-spectral images. Utzinger states in his abstract:

“Tissue is illuminated with a primary radiation to generate secondary radiation, which is filtered to select a second wavelength and a second polarization.” His secondary filters are shown at 22, 24 and 26. In the one case where he refers to a tunable parametric oscillator (column 4, lines 8-9), he is using the OPO to produce light at a narrowband wavelength chosen to excite fluorescence on the cervix, not to “produce short pulses of light at selected narrow band wavelengths within a broad spectral range”.

Applicant’s current amendment clearly distinguishes the present invention from anything disclosed or suggested by Utzinger. Utzinger clearly illuminates with one wavelength range and detects at another wavelength range. Applicant illuminates and detects at precisely the same wavelength range.

Summary

The present invention provides a tunable OPO that is used to directly illuminate a target and the reflected or transmitted image of the target at precisely the same wavelength as the laser is recorded. The process is repeated multiple times, while the laser wavelength is changed. The result is a "stack" of images, each taken at a different wavelength that can be used to "identify the chemical components of the target. The invention is based on the ability of the OPO system to generate narrow band wavelengths one at a time, and there is no need for any filters to restrict either the illumination source or the detection device. The ability to obtain high intensity of the tunable laser source and the short pulse permits detection of variations in optical parameters of reflection and transmission. These images can be obtained in various spectral ranges and can be useful in a wide variety of applications. The prior art does not disclose or suggest the present invention.

CONCLUSION

Thus, for all the reasons given above, this application, as the claims are presently limited, defines a novel, patentable, and truly valuable invention. Hence allowance of all outstanding claims is respectfully submitted to be proper and is respectfully solicited.

Respectfully Submitted,



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